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EDUCATIONAL RE-ENTRY FOR  
BRAIN INJURED CHILDREN

By

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B.Sc., University of Alberta, 1985

Submitted to the

Department of Communication Sciences and Disorders

and the Graduate School

in partial fulfillment of the requirements

for the degree of

Master of Communication Sciences and Disorders

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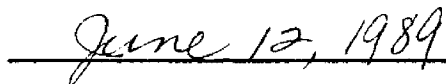
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## TABLE OF CONTENTS

Chapter	Page
I. Introduction.....	1
II. What is Brain Injury?.....	5
Definition	5
Causes	6
Initial response to injury	7
Initial assessment following injury	9
Stages of recovery	12
Sequelae of behaviors	15
Residual deficits	17
III. The Role of Rehabilitation.....	19
Roles of team members	21
IV. Educational Reintegration.....	25
Educational implications	25
Placement considerations	27
Easing transition to school	29
Follow-up	32
V. Glenrose Rehabilitation Program for Brain Injured Children.....	36
Case studies	42
VI. Issues and Management Suggestions for Brain Injured Children.....	48
Issues/problems	48
Suggestions	55
a) Easing school transition	55
b) School modifications	58
c) Future research	62
VII. Concluding Remarks.....	65
Bibliography.....	68

## CHAPTER I INTRODUCTION

Closed head injury has been referred to as a "silent epidemic" (Klein, 1982 in Vogenthaler, 1987). Though pediatric head injury is quite prevalent, society has little knowledge of head injury, its frequency and its effects. Research has only recently addressed the severity of injury and the stages of recovery for children following head injury. As a result, few educational programs have been developed to deal specifically with the deficits of a brain injured child. Professionals and family members of brain injured patients have just begun to address the needs of the pediatric head injured population. Organizations have been developed to advocate for brain injured individuals and to educate society about brain injury and its manifestations.

A study by the National Institute of Neurologic Communicative Disorders and Stroke revealed an incidence of 422,000 cases of traumatic brain injury per year in the United States (Anderson and McLaurin, 1980 in Vogenthaler, 1987). Ylvisaker (1988) reported greater than one million children sustain head injuries of varying degrees each year in the U.S. It was also reported that approximately 926,000 individuals, in a six month period, required services due to the effects of head injury (Anderson and McLaurin, 1980 in Vogenthaler, 1987). While it has been difficult to report the incidence and prevalence of pediatric brain injuries

accurately, investigators have estimated that 42% of all closed head injuries occur in individuals under the age of 20 (Anderson and McLaurin, 1980 in Vogethaler, 1987). Closed head injuries accounted for one sixth of the admissions to pediatric hospitals and two thirds of all fatalities of children (Eiben, Anderson, Lockman, Matthews, Dryja, Martin, Burrill, Gottesman, O'Brian, and Witte, 1984). Head injury is considered to be the leading cause of death in children older than twelve months (Ylvisaker, 1988).

These statistics suggest the occurrence of brain injury is not uncommon. In fact the incidence of head injury has increased since the 1950's (Rutter, Chadwick, Shaffer, and Brown, 1984). Incidence has increased and so has survival. With improved medical care and technology, individuals with more severe injuries are surviving (DePompei and Blosser, 1987).

Recovery of the pediatric head injured population depends on important variables such as: age, location of injury, "neurologic spontaneous recovery, normal growth and development and the effect of intensive rehabilitation" (Eiben et al, 1984). But some degree of deficit will likely remain, especially if the injury was severe. Special programming may be required as a result of changes in cognitive functioning following a brain injury. Changes may be observed in communication, physical, motor, emotional and/or behavioral processes (Hagen, 1981). These changes in functioning can be devastating for the patient whose life has changed



dramatically and for the family who must cope with the impact of the injury.

Due to increased survival rates among severely head injured patients and the overall improvement of rehabilitation of this population, an increasing number of head injured children are able to return to school (DePompei and Blosser, 1987; McGuire and Rothenberg, 1986). As a result the need to plan and implement appropriate programming for brain injured students continues to increase. For educational reintegration to be successful one must consider the following: the implications of the residual deficits on school performance, placement options and related educational problems that may arise. There has been little investigation concerning the educational implications following a brain injury. Continued research is necessary to promote successful re-entry of brain injured children to school (DePompei and Blosser, 1987). As yet, the frequency of successful reintegration for head injured students is relatively unknown (Ylvisaker, 1985 and 1987).

Other issues arise for the school-aged population who sustain a head injury. Some children are not referred to a rehabilitation program, some are placed in inappropriate programs that do not meet their special needs, and others "fall through the cracks" when they do not meet the criteria for funding or special education. Frequently, these circumstances result in "school failure, behavioral maladjustment and family disruption"

(Ylvisaker, 1985). Time and energy must be spent to research this population, to develop appropriate programs and to educate society about the effects of head injury, to ensure successful, positive returns to school and the community.

The purpose of this paper is to provide background information about head injury. The causes of head injury, the stages of recovery and the behavioral sequelae following a brain injury will be reviewed. The main focus of the paper will include educational implications following head injury, placement considerations, school transitions and follow-up. Suggestions that may facilitate educational re-entry of brain injured children will be provided. The paper will also include an outline of the unique program for brain injured students at the Glenrose Rehabilitation Hospital in Edmonton, Alberta, Canada. The hospital has a specific program for head injured children incorporated into its facility. The program and its protocol will be discussed. Management issues and the population's needs will also be addressed.

## CHAPTER II      WHAT IS BRAIN INJURY?

### DEFINITION

For the purposes of this paper, brain injury refers to the closed head injury population. When the term closed head injury (CHI) is used, it means the person has "sustained a blow to the head causing diffuse rather than a focal brain injury" (DePompei and Blosser, 1987). The damage can occur anywhere within the brain and varying deficits may result. Unconsciousness (regardless of duration) or "seizures, headaches, vomiting or discharge of cerebrospinal fluid through the nose or ears" also occurs (Vogenthaler, 1987). The skull or dura however is not disrupted (Groher, 1977; Hagen, 1981).

"Bleeding may occur as a result of brain injury, due to damage to the blood vessels of the scalp, skull bones and brain" (Miller, 1988). This is referred to as a hemorrhage. A hemotoma has occurred when a mass of blood is confined to a small space. The hemotoma may result in further injury as it may increase the intracranial pressure, which compresses the brain into a smaller space (Miller, 1988). The damage in a closed head injury is widespread and results in "multiple, unpredictable disabilities" (Vogenthaler, 1987).

## CAUSES

Closed head injuries can result from motor vehicle accidents, falls, sports injuries, and abuse. Research indicated that the primary cause of head injury varies with age, severity, sex, socioeconomic status and geographic location (Ylvisaker, 1988).

Age- The literature indicated that the cause of brain injuries changes primarily as a "function of age" (Goldstein and Levin, 1987). Children under 5 years of age sustained head injuries most frequently from falls. Pedestrian motor vehicle and bicycle accidents were most common in children ages 5 to 14. Motor vehicle accidents were most prevalent for children older than 15 years (Goldstein and Levin, 1987; Levin, Benton and Grossman, 1982, in Routh, 1987). Investigators reported that the most prevalent cause of brain injuries in school-age children was motor vehicle accidents (49%), followed by falls (28%) (Ylvisaker, 1985). Sports related injuries were more frequent among the school-aged population than for the preschool or young adult population (Ylvisaker, 1985).

Severity- Investigators reported the most common cause of injury, when all degrees of severity were considered, was falls (greater than 40%), followed by motor vehicle related accidents. However, when only severe injuries were included, the number one cause of injury was motor vehicle accidents (50% vehicle/pedestrian, 25% passenger) (Ylvisaker, 1988). For infants who sustained severe head injuries, the most common cause was abuse. Some studies reported an incidence of greater than 60% (Ylvisaker, 1985).

Sex- Researchers agreed on a greater incidence of brain injury among males than females (Brink, Imbus and Woo-Sam, 1980; Ylvisaker, 1985; Eiben et al, 1984; Vogenthaler, 1987; Goldstein and Levin, 1987). Males were more likely to sustain severe head injuries than females (Goldstein and Levin, 1987). Studies also indicated that "males show an increased incidence of head trauma from ages 5 to 25" while females showed a decreased incidence during their first 15 years (Goldstein and Levin, 1987). One study suggested the prevalent cause of injury in females was pedestrian accidents. For males, however, motorcycle/motor scooter accidents were most common, followed by motor vehicle accidents (Gilchrist and Wilkinson, 1979).

#### INITIAL RESPONSE TO INJURY

Following a CHI, the patient's level of consciousness varies. "If loss of consciousness lasts for more than a brief period, the

person is considered to be in coma" (Miller, 1988). Coma is defined as "an unarousable state in which the patient does not open his eyes, does not obey commands or speak" (Rosen and Gerring, 1986). The injury is considered to be severe if the duration of the coma is greater than six hours or if post-traumatic amnesia (PTA) is greater than seven days (Rosen and Gerring, 1986). PTA refers to the period of time between the injury and the return of continuous day to day memory (Routh, 1987). During this time the patient is disoriented and unable to recall day to day events due to his/her inability to process information adequately for future retrieval. The length of PTA is used as a prognostic indicator of recovery following traumatic brain injury (Routh, 1987).

Investigators have reported different pathophysiological responses between children and adults to traumatic brain injury. In children, diffuse brain swelling was found within several hours of injury in approximately one third of severe head injuries (Bruce, Raphaely, and Goldberg, 1979 in Fletcher, Ewing-Cobbs, McLaughlin, and Levin, 1984). However, brain lacerations, intracranial contusions and hematomas were reported to occur less frequently in children than adults (Fletcher et al, 1984). Mortality was noted as lower for the pediatric age group than for adults with comparable injuries (Fletcher et al, 1984; Goldstein and Levin, 1987). Bruce, Schut, Bruno, Wood, and Sutton (1978)

indicated from clinical experience that children recover from brain injury better than adults do. However, they found that research does not support a lower mortality rate in children. Studies suggested "the differences in recovery between children and adults may not be so great if children with lesser injuries are not included" (Bruce et al, 1978). Presently, investigators are questioning if mortality rate is indeed lower for the pediatric population (Ylvisaker, 1988).

#### INITIAL ASSESSMENT FOLLOWING INJURY

Initially while the child is in intensive care, the goal of treatment is to prevent secondary brain insults (Jaffe and Hays, 1986). Needed medical action is taken to achieve medical stability (Vogenthaler, 1987). Various assessment procedures are utilized to determine the patients' medical needs and treatment requirements. One of the first assessments used to measure the length and depth of coma is called the Glasgow Coma Scale (GCS). The scale is comprised of three components- eye opening, motor ability and verbal ability. Each component has a three to six point scale. The measures from each component are added together. The result is a score of three to fifteen. A value of 3 indicates the most profound coma recordable by the scale. The highest score one can obtain is 15 (Bruce et al, 1978). A Glasgow Coma Score of 3 to 8 indicates a severe head injury (Rosen and Gerring, 1986; Kraus,

Fife, and Conroy, 1987). If a patient receives a score of 8 or less, the patient will usually be admitted to an intensive care unit. If a score of greater than 8 is achieved, the patient will be admitted to a neurology or neurosurgical unit, where the care is not as intensive (Rosen and Gerring, 1986).

The purpose of the scale is to allow for an effective method of recording the neurological status of patients on admission and for continued assessment thereafter. The developers attempted to make the scale clear and simple to decrease the variability between users (Teasdale and Jennett, 1974, in Routh, 1987). Another important function of the scale is to allow for easier comparisons between clients, though other information such as age, length of coma and location of the injury would be necessary for adequate comparisons.

Difficulties have been documented when investigators have attempted to compare studies of clinical outcome following head injury. Often comparisons were not possible because the description of patients was inadequate or the differences in classification were too great for comparisons (Bruce et al, 1978; Goldstein and Levin, 1987). Consistent use of the Glasgow Coma Scale may be one step in facilitating research regarding recovery and outcome in children.

James and Trauner (1985) modified the Glasgow Coma Scale for use with infants. These investigators are some of the few who have



developed a scale based on the pediatric population. Difficulties arise when estimates of recovery and outcome for head injured children are requested, as most instruments used to measure length and depth of coma and recovery are based on the adult population. Documentation based on the pediatric population are lacking. Research has suggested that children's emergence from coma is similar to that of adults (Fletcher et al, 1984); however, the recovery process between adults and children following a brain injury is different (Levin et al, 1982; Ylvisaker, 1988). Further study of recovery in brain injured children is warranted to allow professionals to estimate recovery and outcome with greater confidence and accuracy.

Shortly after injury, the most common diagnostic test given to head injured individuals is the CAT (Computed Axial Tomography) or CT (Computed Tomography) scan. This instrument provides a series of photographs at different levels of the brain. The CT scan is used to identify "intracranial bleeding or hemotoma" or other changes in the brain that require immediate attention, either via drugs or surgery (Rosen and Gerring, 1986). The CT scan is a quick, noninvasive test that can reveal "disruption of brain substance, general or localized swelling and areas of bleeding" (Rosen and Gerring, 1986).

A standardized method of measuring post-traumatic amnesia (PTA) in children has been developed. It is called the Galveston

Orientation and Amnesia Test (GOAT) (Levin, O'Donnell and Grossman, 1979). The GOAT measures an individual's orientation to person, place and time "and to the first event recalled before and after the injury" (Routh, 1987). The degree of PTA may be determined by comparison to norms based on normal children (Fletcher et al, 1984).

PTA occurs upon emergence from coma and is defined as cleared once the individual begins to remember daily events. The development of assessment tools based on the pediatric population continues to be an area of need to allow professionals to more accurately predict outcome and recovery.

#### STAGES OF RECOVERY

While emerging from coma, patients go through various stages of recovery. Investigators have identified three general stages of recovery. The first stage is called the Early Stage. In this stage, the child has difficulty processing information, may have language problems and may demonstrate agitated behavior (McGuire and Rothenberg, 1986). The next stage is called the Middle Stage. During this stage the patient demonstrates an increased ability to understand, an intolerance to stimulation and decreased compliance. Most efforts by family and staff members during this stage are spent on controlling the behavior of the patient. The last stage is called the Late Stage. At this stage children appear

normal in appearance and in casual conversation. However, "subtle cognitive deficits may impair functioning. Decreased attention span and ability to use abstract concepts" often occur and may effect future academic capabilities (McGuire and Rothenberg, 1986).

A patient may plateau at any stage. These stages should not be confused with the length of time following the injury. Some patients reach a plateau at the Middle Stage of recovery and do not move beyond this level of functioning. One must be careful also not to infer cognitive impairments from "severe motor involvements" or intact cognitive abilities from normal talking and walking (Ylvisaker, 1985).

Measures of cognitive functioning levels are also commonly used to categorize the behaviors the patient displays upon emergence from coma (Hagen, 1981). Professionals utilize the Levels of Cognitive Functioning scale to allow for "systematic description and categorization of the patients' level of cognition/language across time" (Hagen, 1981). Initially, patients exhibit great variation in how quickly they proceed through the levels. Team members observe and assess the "type, nature and quality of the patient's behavioral responses to help estimate the level the patient is functioning in the hierarchy of cognitive processes" (Hagen, 1981). Use of the Levels of Cognitive Functioning scale during assessments facilitates the development

of appropriate treatment programs. Optimally, treatment should provide stimuli at a level where the patient is most stable and at the next higher level to challenge the patient (Hagen, 1981).

The Levels of Cognitive Functioning were developed at the Ranchos Los Amigos Hospital in California and are often referred to as the "Rancho Scale" (Rosen and Gerring, 1986; Ylvisaker, 1985).

The eight Levels of Cognitive Functioning include:

- I- No response
- II- Generalized response
- III- Localized response
- IV- Confused-Agitated
- V- Confused-Inappropriate-Nonagitated
- VI- Confused-Appropriate
- VII- Automatic-Appropriate
- VIII- Purposeful-Appropriate

These stages are often used as admission criteria by rehabilitation facilities. For example, some settings will not accept a patient until the patient is functioning at Level IV.

Use of cognitive functioning levels as a scale of measurement of behavior should increase the quality of care provided. If all team members refer to the stages of cognitive functioning and assess the patient daily or weekly, changes in scheduling, treatment or management will occur according to the patient's

needs (Hagen, 1981). Rehabilitation professionals need to be familiar with cognitive functioning stages to plan, develop and implement treatment at an appropriate level to suit the patient's functioning level.

#### SEQUELAE OF BEHAVIORS

The resulting behaviors and deficits that present following a brain injury will vary depending on the type of injury, the severity of injury and the location of the insult. Deficits can result in the following areas:

- physical (e.g., mobility, visual, hearing, balance, strength, coordination, motor activities);
- functional (e.g., bed mobility, feeding, hygiene, dressing);
- communication (e.g., understanding others, self-expression, word finding, dysarthria, writing, abstraction, reading comprehension);
- cognitive/perceptual (e.g., attention, memory, processing of information, conceptual skills, problem solving, visual neglect, motor apraxia, motor speed or motor sequencing), and;
- behavioral/emotional/social (e.g., denial, overactivity impulsiveness, restlessness, aggression, poor judgement, emotional lability and depression) (Ylvisaker, 1988).

Numerous studies have documented the stages of recovery and the types of deficits involved when a child has sustained a brain injury (McGuire and Rothenberg, 1986; Vogenthaler, 1987; Ylvisaker, 1986). Sometimes behaviors manifest immediately; sometimes they appear years later. Some behaviors or deficits will diminish over time; others will remain permanently (McGuire and Rothenberg, 1986).

Early Stage- The deficits patients present during the Early Stage of recovery vary from minimal responses to the environment to stimulus specific responses to functional use of objects. The patient may understand simple commands and may attempt expressive communication (Smith and Ylvisaker, 1985). Motor ability is decreased.

Middle Stage- When the patient has progressed to the Middle Stage of recovery, he/she demonstrates confusion. The confusion is the result of "general disruption and depressed functioning of the cognitive system" (Haarbauer-Krupa, Moser, Smith, Sullivan and Szekeres, 1985). At this stage patients have difficulty processing information efficiently, have decreased recent memory and access to knowledge. Patients are "disoriented to person, place and time", however they are alert and "generally responsive to the environment" (Haarbauer-Krupa et al, 1985). At this stage most patients can function in individual treatment or structured group

treatment. Communication can vary from yes/no responses to intelligible speech.

Late Stage- The patient may continue to exhibit motor impairments, otherwise at this stage the patient appears to be at his/her level of pretraumatic functioning. However, closer examination may reveal residual deficits. Remaining impairments may include: decreased attention and concentration, decreased processing of information, especially when length, complexity, abstractness and rate are increased, difficulty retrieving words or information, inadequate organization skills, socially inappropriate behavior and difficulty with self-monitoring skills (Haarbauer-Krupa, Henry, Szekeres and Ylvisaker, 1985).

#### RESIDUAL DEFICITS

Of the children who survive major head injury, many have permanent cognitive deficits (Ylvisaker, 1985, 1986, 1988). Numerous studies have documented the deficits that occur following a brain injury (Ewing-Cobbs, Fletcher and Levin, 1986; Levin and Eisenberg, 1979 in Ewing-Cobbs et al, 1986; Payne-Johnson, 1986; Hagen, 1981; Eiben et al, 1984; Vogenthaler, 1987; Ylvisaker, 1986; Fletcher et al, 1984) and most investigators agree on the areas of deficit. Common deficits fall into three major categories: Cognition, physical, psychosocial/behavioral/emotional (Vogenthaler, 1987). Decreases in intelligence, subtle problems

in visual-motor skills, decreased memory, attention, language and inappropriate social behavior are a few examples of deficits.

Attention and memory were documented to be the most common cognitive deficits following a brain injury (Levin and Eisenberg, 1979 in Ewing-Cobbs et al, 1986; Payne-Johnson, 1986; Eiben et al, 1984). Eiben and his colleagues (1984) found cognitive and communicative limitations contributed most to dependency of patients after a brain injury. The cognitive deficits that contributed to dependency were decreased short and long-term memory. Ben-Yishay and Diller (1983a, in Vogenthaler, 1987) stated decreased cognition was the primary cause of difficulties encountered in "social readaptation, independent living, family life and vocational pursuits". Overall, gross and fine motor function were found to be "better preserved than cognitive and social function" (Eiben et al, 1984).

A child who has survived a brain injury will likely have varying degrees of deficits remaining that will have an impact on the child's ability to "participate in a school program" (Pollack and Savage, 1985; Rosen and Gerring; Ylvisaker, 1985). The extent of disability is dependent upon numerous factors (e.g., severity and location of the injury).



### CHAPTER III THE ROLE OF REHABILITATION

The goal of professionals involved with the rehabilitation of brain injured children is to facilitate the patient's ability to attain the highest level of functioning possible. Returning to the community and to school successfully is the main objective in the rehabilitation process (Vogenthaler, 1987). A rehabilitation team plays a significant role in the patient's return to school.

Research has indicated that early placement of "appropriate, comprehensive" rehabilitation services can enhance recovery following closed head injury (Vogenthaler, 1987). During the rehabilitation process many professionals are involved. Each professional applies their special skills. Team members typically include: physiatrist, neuropsychologist, nurse, physical therapist, speech and language therapist, occupational therapist, recreation therapist, cognitive rehabilitation therapist/psychologist, social worker, teacher, and education specialist. The coordination of services is a vital necessity during this phase of recovery.

Services should be provided in an interdisciplinary manner. The needs of the whole person must be responded to, not just one deficit area. Team members must work together to facilitate generalization of treatments to other settings and situations. Since generalization and new learning are common areas of deficit,

team coordination becomes even more crucial during the recovery process (Vogenthaler, 1987). Each professional should be aware of appropriate assessment tools so that the patient's deficits throughout the recovery process can be measured adequately. Only then can appropriate programming and treatment be implemented by the interdisciplinary team.

The patient may receive rehabilitative services while in intensive care. Whether services are provided or not depends on the patient's condition. If possible, a program aimed to prevent "complications of muscle contracture and joint capsular tightness" would be implemented (Jaffe and Hays, 1986). The treatment would involve optimal positioning, range of motion exercises and splinting. Treatment at this stage must be passive.

When a patient is medically stable he/she should be transferred to an intensive rehabilitation program. Typically, inpatient interdisciplinary rehabilitation following a severe brain injury "involves a minimum of 30 to 90 minutes per day each of occupational, physical and speech therapy" (Jaffe and Hays, 1986). Other services may include "academic and neurological assessments, psychological counselling, educational remediation and recreational therapy" (Jaffe and Hays, 1986). Due to the lack of documentation regarding treatment efficacy and outcomes, criteria to assist professionals in the selection of patients who will benefit from the costly and limited rehabilitative services

have not been established (Jaffe and Hays, 1986). Research is needed to assist rehabilitation professionals in choosing appropriate candidates for intensive rehabilitation.

Initially in rehabilitation, the child's premorbid functioning levels should be reviewed, as well as the child's history. It is important to be aware of premorbid levels as it is unlikely that intervention would elevate the degree of deficit above premorbid functioning. In addition, the details regarding the injury and any complications or secondary injuries must be ascertained. This information provides direction for initial assessments and consultations and facilitates the development of appropriate and realistic rehabilitation goals and strategies. It also allows the team to set a time frame for rehabilitation and prepares staff for problems they may encounter during the "early phase of treatment" (Jaffe and Hays, 1986).

#### ROLES OF TEAM MEMBERS

Physical therapy The goal of physical therapists is to improve and maintain motor functions. Initially bed positioning and range of motion exercises are emphasized. Following improvement in the acute recovery phase, the focus of treatment changes to muscle strength and mobility, balance and voluntary control to improve physical movements (Vogenthaler, 1987).

Occupational therapy The goal of occupational therapy is to remediate perceptual deficits to provide adequate sensory information for motoric activities. Areas emphasized include: visual perception, somatosensory deficits (e.g., body image, neglect), praxis (e.g., planning and controlling movements, sequencing activities), visual (e.g., tracking objects- catching a ball), orientation, activities of daily living and community skills (e.g., shopping) (Vogenthaler, 1987).

Speech and Language Therapy The emphasis of speech and language therapy is on improving the speech system's functioning (eg., dysarthria), improving inadequate higher order cognitive abilities which are required for adequate verbal or symbolic communication and teaching compensatory strategies when sufficient improvements cannot be made (Vogenthaler, 1987). Therapy may include the following areas: receptive, expressive or integrative language, verbal reasoning, verbal memory or new learning skills (Baxter, Cohen and Ylvisaker, 1985). Therapy with the family may be provided to enhance communication between family members and the patient.

Physiatry The responsibility of the physiatrist is to assess the patient's medical status, obtain necessary consults, and request diagnostic procedures, such as a CT scan, when necessary. He/she should also be involved in long term follow-up of these patients.

Nursing The main focus of nursing is thorough assessment and care of the patient. The level of care is revised upon change in the patient's medical status and cognitive and physical functioning levels (Yanko, 1985).

Recreation therapy The main focus of recreation therapy is to enhance socialization skills, to assist the patient in his/her choice of recreational activities and to assist with any necessary adaptations of those activities.

Social Worker The social worker typically is involved with counselling of the patient and/or family. The social worker will investigate placement options and funding sources when necessary.

Psychology/Cognitive retraining therapy The focus of these team members includes cognitive intervention, counselling and behavior analysis. Remediation may include the following: interpersonal, social, educational and vocational skills, activities of daily living and independent living skills (Vogenthaler, 1987).

Education As discharge approaches and planning for school re-entry begins, the education member of the team may assess the patient's academic status and areas of strength and weakness. Team members can then determine what type of school placement will be feasible for the child.

Interdisciplinary team management has many advantages. The expertise of each team member facilitates meeting the unique needs of each brain injured child more readily. Each professional plays

a significant role. The team approach allows the team to have a better understanding of the "whole picture", not just one aspect of the child's level or skill. "Every effort should be made towards increasing the effectiveness" of interdisciplinary team management of patients to insure the best possible treatment is given during the rehabilitation phase of recovery and during follow-up procedures (Savage and Carter, 1988). Efficacy studies documenting interdisciplinary team management are needed to facilitate improvement of this approach.

## CHAPTER IV EDUCATIONAL REINTEGRATION

### EDUCATIONAL IMPLICATIONS

A discussion of the educational implications following brain injury will follow. The effect of a brain injury on school performance will be dependent on the deficits that remain. For example, one requires memory and attention in order to learn. Since memory and attention deficits are common following a brain injury, significant academic difficulties may arise, "particularly in the acquisition of new material" (Ewing-Cobbs et al, 1986). Due to less efficient learning and memory functions, "repetition and multimodal cueing are often needed to consolidate" new material (Cohen, 1986). Brain injured students must rely upon many "external strategies for learning, retention, and recall" (Rosen and Gerring, 1986). Another example is "reduced metacognition" (Rosen and Gerring, 1986). When this deficit remains individuals are unable to monitor their progress, or identify their weaknesses and achievements. These metacognitive skills are "integral" components for planning to learn (Rosen and Gerring, 1986).

Inconsistency is a common characteristic of head injured individuals and has implications for school performance and programming. Brain injured patients may exhibit inconsistencies across skills. A child may appear normal in his/her language skills, but perform poorly in orientation and problem solving

tasks. Inconsistencies within skills may occur. For example, a child may have difficulty with simple arithmetic, yet be able to perform more difficult mathematical tasks. Inconsistencies may also be exhibited over time. An individual may perform well on a task one day and perform poorly the next day (Vogenthaler, 1987). Most importantly, family members, teachers and others in contact with the child must understand inconsistent performance is common following brain injury. Otherwise, negative consequences may result (e.g., high expectations, punishment) (Vogenthaler, 1987).

A student who has difficulty attending will be distracted easily and demonstrate poor concentration skills (Pollack and Savage, 1985; Rosen and Gerring, 1986). Frequent reminders may then be needed for the student to complete a task. A child may have difficulty processing directions or other information and may require reminders to listen; he/she may require an unlimited amount of time to complete assignments and tests to obtain a true measure of his/her capabilities. A child with a brain injury may be unable to change or shift his/her attention from one task to another without assistance. This child may then need help to initiate a task or complete transitions, either between classes or subjects.

Organization of information is another common problem following a brain injury. Deficits may present in summarizing, sequencing, outlining and differentiating more relevant from less



relevant information. Assistance may be necessary to guide the child to increase his/her organizational abilities. A step by step structure tends to help these students.

#### PLACEMENT CONSIDERATIONS

The child must exhibit certain behaviors prior to reintegration to the school system: He/she must be able to "attend to a task for 10 to 15 minutes, tolerate 20 to 30 minutes of general classroom stimulation, function in a group of two or more students", must have meaningful communication skills, follow simple directions and demonstrate potential to learn (Savage and Carter, 1988; Cohen, 1986; Cohen, Joyce, Rhoades and Welks, 1985).

Educational options include the following: regular classroom placement, regular class with support services (consultation with teacher, special education teacher, speech, physical, or occupational therapy, psychological or counselling services), resource room, self-contained classes and residential programs (Savage and Carter, 1988; Cohen, 1986). "Special support services should be recommended when determining school placements for head injured children" (Cohen, 1986).

When plans for school placement begin, factors such as "location and extent of damage, severity of injury, student's previous academic" capabilities and the stage of recovery in which the student is re-entering must be considered (Miller,

1986). These factors all play a significant role in determining appropriate placement options for school (Miller, 1988; Rosen and Gerring, 1986).

The interdisciplinary rehabilitation team should be familiar with available options and the laws concerning special education. Only then can the team make appropriate recommendations regarding programming for these children. Important factors the team should be knowledgeable about include: the requirements for acceptance into special education programs, the requirements by the school system to serve these children and the funding sources (Cohen, 1986; Savage and Carter, 1988). Teams having an education specialist will have a resource person to contact about school requirements and programs which should facilitate appropriate decision making regarding school re-entry.

In addition, one must remember that "traditional educational goals may be inappropriate for head-injured students" (Cohen, 1986). Most curricula stress the teaching of academic subjects, such as reading and mathematics. Often it is assumed the student is able to integrate the basic processes (ie., demonstrate attending, processing and organizing skills). Students must be able to attend, remember information and organize thoughts and materials to complete academic requirements. Those students with more general cognitive deficits may be unable to learn the academic subjects. Teachers may be responsible to develop

students' cognitive skills before attempting to teach academics (Cohen, 1986).

Most importantly, to plan this population's return to school, one must consider the individual and his/her unique needs. Through rehabilitation, team members are able to assess and identify areas of strength and weakness. Team members may also identify appropriate and inappropriate teaching strategies for a particular child, as well as the types of strategies that help the child compensate for any remaining deficits. The team members' findings are very important to relay to the school, especially the classroom teacher. The information gathered by the team members during the rehabilitation process should be shared with parents as well as school personnel. Sharing of information should be the beginning of interdisciplinary teamwork by all individuals having contact with the brain injured child. With all individuals working together, the chance of positive and successful reintegration to school should increase.

#### EASING TRANSITION TO SCHOOL

Returning to school is a difficult step for a child who has sustained a brain injury. The child's familiarity of the school and peers has changed due to the long absence from the school setting. Evidence of the injury probably remains (Rosen and Gerring, 1986). "To return to school, is to return alone and

different-different from the person the student once was and also different from everyone else" (Rosen and Gerring, 1986). The goal for rehabilitation professionals, family, friends and school personnel is to ease the transition to school.

"Transition is often mistakenly thought of as a one day activity. In fact, effective transition of the brain injured student may take several days, weeks, or even months" (Savage and Carter, 1988). In addition, the brain injured child will most likely need a "comprehensive educational plan" which will require flexibility and continual adjustments to best meet the student's needs (Savage and Carter, 1988).

Ronald Savage (1987) identified four factors that make school transition difficult for brain injured students. One factor was that some of these youngsters were not referred for rehabilitation services. Consideration of rehabilitation services decreases if facilities are not available in the community or if the child appears "normal" during casual contact. These children may be discharged immediately from acute care facilities and may return to school. The child may not be ready to handle the classroom situation. Cognitive deficits such as distractibility, memory problems and processing difficulties may be evident and will decrease the child's ability to participate in the school program. Failure may result.

Another factor identified was that society is unaware of brain injury and its deficits. As such, teachers may be unaware of how cognitive, psycho-social, or physical deficits affect performance in the classroom. The child's academic or behavioral needs may not be met and the program may be inadequate. The school may not be prepared to meet the needs of the child. Even if the child was at an appropriate level of recovery to be placed in school, the potential for failure in this situation is high.

The third factor identified was availability of appropriate programs. Specific programs to meet the brain injured child's unique needs are few. As such, these students may be placed in programs developed for children with handicaps or deficits that greatly differ from the brain injured students' deficits.

Students who have sustained a severe closed head injury have "qualitatively different" cognitive deficits than learning disabled or mentally handicapped children (Ewing-Cobbs et al, 1986; Light et al, 1987). The differences between closed head injury and other handicaps includes the following: a premorbid self-concept of being normal, previous positive experiences in an academic and social setting, discrepancies in skill levels and abilities, inconsistencies in performance patterns, variability and fluctuations during the recovery process, more extreme problems with generalizing, integrating or structuring information, uneven in the extent of damage and recovery of

cognitive skills, need for a variety of compensatory and adaptive strategies to learn, and rapid relearning of previously learned information (Cohen et al, 1985; Rosen and Gerring, 1986; DePompei and Blosser, 1987). If plans are made with other populations in mind, the needs of brain injured students will not be met (DePompei and Blosser, 1987). Inappropriate placements "may only further complicate cognitive recovery and the redevelopment of psychosocial skills" (Savage, 1987).

Finally, a team should be developed to make decisions regarding the child's educational program. The team must have enough expertise and knowledge to best meet the child's unique and changing needs. The optimal team should include: special education teacher, classroom teachers, administrators, parents, school nurse, medical personnel from the hospital, guidance counsellor or school psychologist, a vocational rehabilitation counselor and, if possible, an advocate from a local or national head injury organization (Savage, 1987). Without teamwork and a representation of all significant members, the child's chances of failure increase.

#### FOLLOW-UP

When brain injured children are discharged from a hospital or rehabilitation center to the family, school and community, what follow-up occurs and for how long? Follow-up should occur after

discharge, especially when the child is placed in a school program. The follow-up procedures should provide the answers to the following questions: Is the school program appropriate? Were the recommendations and program requirements met? Is the student coping with the program? Is the family coping with the child? The rehabilitation staff must continue long-term evaluations (e.g., cognitive, gross and fine motor and speech and language skills) so program or placement changes are made as the child's needs change (Savage and Carter, 1988).

Few investigators have examined the type and severity of academic difficulties following brain injury (Ewing-Cobbs et al, 1986). Studies that have documented brain injured children's performance in school indicated persistent impairments following a severe brain injury (Chadwick, Rutter, Brown, Shaffer and Traub, 1981). A study by Shaffer and colleagues (in Ewing-Cobbs et al, 1986) evaluated reading ability in brain injured children. Findings revealed 55% of the children were reading one or two years below their chronological age level and 33% performed two or more years below their chronological age level. A study conducted by Mark Ylvisaker (1986) indicated that head injured children's expressive deficits were reported most frequently by teachers as affecting academic performance. Klonoff, Low and Clark (1977) reported 26% of the children investigated had failed a grade or been placed in resource room classes. Other investigators reported

a high rate of head injured children required special education services (Ewing-Cobbs et al, 1986). The research conducted thus far indicated that brain injured children exhibit various impairments that affect school performance.

"Since formal educational programs" have not been developed for those who have sustained a brain injury, "schools often need to make adaptations in both mainstream and special education settings for this population" (Cohen, 1986). Appropriate adaptations are not always made so these children are often inappropriately placed. Due to these circumstances, follow-up becomes a vital necessity for the brain injured population (Savage and Carter, 1988).

Results from follow-up must be documented to increase the development and implementation of services for this population. Without follow-up and appropriate documentation of findings, the time and effort spent in rehabilitation and discharge planning may fail. These children may not attain their maximum potential. Research has documented that changes in functioning levels occurred up to five years post-injury in brain injured children (Klonoff et al, 1977); so it is important to provide follow-up procedures for at least five years after the injury to determine the brain injured populations' potential.

Lack of funding was viewed as a problem that limited long-term follow-up. Educating those who effect change in the



distribution of funding sources is needed to increase the occurrence of follow-up, at least until the community is able to cope with the child and his/her needs sufficiently (Price-Spivack, 1986).

The brain injured population changes over time and ongoing evaluations are necessary for identifying changes, progress or lack of progress. As a result of follow-up, changes in placement or programming will occur as needed and the child will have the best chance possible for attaining his/her maximum potential.

## CHAPTER V GLENROSE REHABILITATION HOSPITAL PROGRAM FOR BRAIN INJURED CHILDREN

The Glenrose Rehabilitation Hospital is a tertiary care facility. The Pediatric Brain Injury Rehabilitation Program (P-BIRP) is one of several programs available at this facility. The purpose of P-BIRP is to help the patient by facilitating the return of function, developing compensatory strategies and aiding integration into the family, school and community at his/her optimal level. A rehabilitation team consisting of highly skilled health professionals, educators, the patient, family and other community members best achieve this purpose. For the patients considered non-rehabilitative, the P-BIRP team acts as patient advocate and provides support for family members.

### GOALS

The goals established for the program include:

1. Helping the patient during the rehabilitation process, through an integrated team approach, achieve the highest level of functioning possible, in all function areas.
2. Continuous assessment of the brain injured child's capabilities.
3. Educating the patient, family, health care personnel and the community about brain injury and its implications.

4. Providing support and encouragement to the patient and family during rehabilitation and during the process of reintegration to the school and community.

5. Supporting the development of resources in the community, including residential or training facilities.

6. Encouraging and participating in clinical research of brain injury and rehabilitation of brain injured clients.

7. Devising an evaluation procedure to allow team members to monitor the program's effectiveness.

#### CRITERIA

The criteria for acceptance into the Pediatric Brain Injury Rehabilitation Program is as follows:

- brain injury was sustained as a result of external or internal forces
- patients must be between the ages of 1 to 17 years
- patients must be medically stable, with or without medication
- patient must exhibit a well established system of nutrition, hydration and respiratory function
- patient may have gastrostomy tubes or tracheotomies
- if the patient is at Level III-Localized response (Rancho Los Amigos Scale), the patient is evaluated for a period of 8 weeks to determine if continued rehabilitation is warranted

-if the patient is at Level IV-Confused-agitated, the patient is given a 2 week trial period. If the team notes a lack of improvement and another patient with greater potential for rehabilitation is waiting, the first patient may be transferred back to the referring center. The patient may be reconsidered at a later date

-if the patient is at Level IV,V,VI,VII (higher level of response), it is at the physician's discretion to admit the patient to the program on an inpatient or outpatient basis.

The team members involved in the Pediatric Brain Injury Rehabilitation program include: physiatrist, coordinator (nurse), speech-language pathologist, psychologist, occupational therapist, physical therapist, recreational therapist, social worker, education teacher, nurse and audiologist. The team consults with: neurosurgeons, ophthalmologists, education specialists (for academic assessment), and other disciplines as required.

Once the patient is accepted to P-BIRP, the patient may be involved in a school program which is developed according to the child's needs and abilities. The school program is incorporated within the hospital setting and allows for a gradual transition to school, while continuing the intensive treatment. The education staff are familiar with brain injury and its manifestations and therefore develop an educational plan that is appropriate for each brain injured student. Some classroom modifications may include:

providing the students with individual assistance and guidance as needed to maintain high levels of success, eliminating time allotments for completion of assignments, decreasing the stress or focus on academics, displaying flexibility in the teaching strategies implemented and providing the student with compensatory strategies that help performance in the classroom. A classroom facility allows the other P-BIRF team members to observe the student in a more normal environment and facilitates the development of functional and appropriate treatment goals.

The Glenrose school hospital program for brain injured children is increasingly being viewed as a setting where brain injured children can go to school and receive treatment indefinitely. Students are encouraged to remain in the program until an agreement on another suitable placement is made by family, P-BIRF team members and other significant individuals. As long as the setting is appropriate and progress is being made, these children are not rushed out of this program. The school program works especially well for students from the city of Edmonton. It is more difficult to keep a child within the program indefinitely when the child is from a rural area. The goal for these children is to return them to their home and community as soon as possible. Research has indicated brain injured children recover best when family members have close contact with the child. As such, these children may not remain in the P-BIRF school

setting as long. The P-BIRP team insures that the rural settings will be suitable for the patient prior to agreeing to discharge the child.

The follow-up procedures implemented by the P-BIRP team include reassessments every 6 months to a year after discharge from the program. The P-BIRP team schedules a clinic every month for patients returning for a reassessment. During the clinic the child's functioning level is reassessed by all pertinent team members. The assessment usually requires a full day. If any changes occur in functioning, school programming, placements, or goals are changed accordingly. Follow-up continues as long as deemed necessary. Typically, follow-up continues until age appropriate levels are achieved or until the community takes over. Sometimes follow-up by P-BIRP takes place even after the child has reached the age of seventeen.

The advantages of P-BIRP are: 1) the team functions on an interdisciplinary basis, therefore coordination of intervention goals and strategies occurs. The team implements team goals which maintains the team's perspective when dealing with the child; 2) functioning as an integrative team helps staff view the "whole picture" versus single skills of the child which improves patient care as team members provide integrated treatment; 3) the goals for treatment are incorporated into the school setting, which is a more "normal" environment for the child. This helps the student

understand the need for treatment and to generalize the skills emphasized in treatment; 4) the student can return to a school setting gradually while receiving intensive treatment. The school setting allows team members to assess the school problems which may arise. The difficulties can be then be dealt with prior to returning to the community school; 6) the follow-up procedures are another advantage of the program. The long-term commitment to brain injured students likely decreases school placement problems and failures.

The disadvantage of P-BIRP is the school program minimizes peer interaction. These children need to have opportunities for social interactions with "normal" children their own age if they are to cope in the community. When they are within the hospital setting as an inpatient the only contact they have is to the other children in the facility. The hospital-school environment may not adequately prepare the brain injured child to anticipate or cope with his/her peers when he/she re-enters the school system. A second disadvantage is that brain injured students in the P-BIRP facility are not learning to cope in their old social and school environment. When community school re-entry occurs, the brain injured child may not be able to cope or use learned compensatory strategies in his/her old environment. The treatment which was meant to ease school re-entry may be lost; the skills learned may not generalize to the old school setting. Another disadvantage is

the decreased contact with family members when a child enters the program as an inpatient. The facility does not provide a place for parents to stay. The child is in a new environment and may be disoriented yet he/she may need to cope without the frequent contact of family members. This situation is especially true for children from rural areas. It would be feasible to incorporate a room for parents to stay in to allow them to be with their child, especially upon admittance to the program.

#### CASE STUDIES

Two case studies will now be presented. The two patients participated in the Pediatric Brain Injury Rehabilitation Program between 1986-1987. The circumstances surrounding these two patients clearly illustrate some of the issues involved in the management of brain injured children and give an indication of the needs of this population.

##### Case 1

D.Y. was 11 years, 11 months when he sustained a brain injury. His injury occurred following the surgical removal of a tumor. D.Y. bled after surgery was completed, causing diffuse damage to the brain. The CT scan showed D.Y. sustained multiple infarcts and had probable cerebral edema. He was in coma for less than a month. He was admitted to P-BIRF in March of 1986 and remained an inpatient until December 1986. He was an outpatient



from December to June, 1987 and at that time attended the P-BIRP classroom.

When discharge planning began D.Y.'s parents were very involved in finding a suitable placement. D.Y. continued to exhibit physical impairments which affected the number of placement options available. D.Y. remained in a wheelchair following his injury and he required the use of a computer. When the team and parents agreed on a school placement, a meeting was planned with the school principal and classroom teacher. The purpose of the meeting was to provide information about brain injury, the injury D.Y. sustained, the deficits that remained and his needs for the classroom and environment. The principal and teacher reported they thought their school program was suitable for D.Y. and that their program could adequately meet his needs.

Arrangements were made for D.Y. to begin in a community school in September, 1987. Initially D.Y.'s mother and the school staff felt D.Y. had made a good adjustment to the school. He was in a modified Grade 7 class of 14. Follow-up contact by the social worker of the P-BIRP team in January, 1988 revealed the mother was concerned about D.Y.. She was concerned about his extreme dislike of school and his emotional behavior. D.Y. was referred to a psychiatrist for an evaluation. The psychiatrist analyzed the classroom situation and concluded that D.Y.'s school placement was inappropriate. He had been placed with mentally handicapped

students. Though D.Y. exhibited cognitive deficits (decreased attention span, difficulty processing information of increasing length and complexity) as a result of his brain injury, he was not mentally handicapped. Planning began for another appropriate school placement and program. D.Y. was enrolled in a private school which primarily had learning disabled children in attendance. He began this program in September, 1988. The most recent follow-up evaluation (October, 1988), which included reassessments of functioning by F-BIRP team members and reports from the school, indicated the program was suitable for D.Y.. Presently, D.Y. is in a classroom of 9 children with grade 7 and 8 academics. He is successful at school now, however, he continues to exhibit extreme anxiety toward school. Perhaps this anxiety toward school is the result of his first placement experience and its negative consequences. Follow-up on this child continues.

D.Y.'s case illustrated the frustrations that often occur following discharge of brain injured students to the school system. Though the school personnel met with the F-BIRP team and information was shared, the brain injured child was still inappropriately placed. Due to the involvement of the parents and follow-up by the F-BIRP team, changes were made relatively quickly, though the child still experienced failure and frustration. The long-term effects of an inappropriate placement are unknown. Careful planning had occurred, however,

misunderstandings still remained. The rehabilitation team must follow-up with the school immediately, when the child is re-entering the school system, to insure the school personnel understand and employ suitable classroom procedures. Observations of the classroom should be made so suggestions and guidelines can be provided for teachers. Investigators need to document these circumstances and attempt to find ways to eliminate problems with school transition as much as possible.

#### Case 2

B.T., age 8 years, 2 months, sustained a brain injury when she was involved in a motor vehicle accident in December, 1986. She had a left sided subdural hemotoma, partial third nerve palsy and remained in coma for a week. She was discharged from the hospital in February, 1987 and returned to her regular school classroom in March. A full-time aide was placed for her in the classroom. Reportedly, the school was inadequately prepared to handle B.T. and her deficits. As such the return to school became a negative experience for B.T. and her family.

The parents were unhappy with the services B.T. received and began to seek assistance elsewhere. B.T. was seen for an outpatient assessment by the P-BIRP team in September, 1987. The assessment revealed B.T. had a short attention span, very poor short term memory, temper tantrums and inappropriate social behaviors. On September 21, B.T. began to attend the P-BIRP

classroom on a part-time basis while receiving treatment. In November, a full-time aide was hired for B.T. for the classroom. Since B.T. progressed well in P-BIRP, planning began for transition to a community school.

The P-BIRP team and B.T.'s parents met with the school division to determine the best program available for B.T.'s needs. Transition to the selected school began in December, 1988. B.T. attended the community school part-time, the rest of the time she continued with P-BIRP. In January, 1988, B.T. began attending school full time. The transition to the school system was smooth for B.T.. Follow-up by the P-BIRP team in February, 1988 indicated the school program was suitable and going extremely well. The parents were pleased with the program and school personnel. In March, 1988, B.T. returned for an outpatient assessment. Improvements were noted by team members in all areas, especially in her social behaviors. B.T. has continued to progress. The next follow-up assessment will be in March, 1989.

The case of B.T. brings up a few issues. One issue is the early discharge from the acute care facility and the second is the lack of education or preparation for the family. B.T. and her family were unaware of the effects and implications of the brain injury. The family stress level was high as they were unprepared to deal with the behavior that manifested following the brain injury. B.T.'s personality and behavior changed dramatically and

the family could not cope with her new behaviors. Some of the stress could have been avoided if the family had received more information. The school was unfamiliar with B.T.'s deficits and their implications on academic performance and were not prepared to handle B.T.'s needs adequately. Increased awareness would have increased B.T.'s chances for success in the classroom. This case also illustrated the importance of parents advocating for their child so appropriate services were implemented and received. The case, however, demonstrates that careful planning among pertinent professionals can allow for successful reintegration into the school system. Following discharge from P-BIRP, B.T. has experienced success and improvements in her skills in her school environment.

## CHAPTER VI ISSUES AND MANAGEMENT SUGGESTIONS FOR BRAIN INJURED CHILDREN

### ISSUES/PROBLEMS

While reviewing the literature about brain injured children, issues concerning management and the needs of this population repeatedly arose. A discussion of these issues and how professionals can begin to resolve some of the problems surrounding the brain injured population will be addressed.

#### 1. Acute Care/Rehabilitation Center Relationship

Research indicated not all children who could potentially benefit from rehabilitation were referred to a rehabilitation facility. A strong relationship between acute care and rehabilitation centers is vital to decrease the number of children who "fall through the cracks" (Savage and Carter, 1988). It is important for acute care personnel to evaluate the client carefully and to consult with a rehabilitation specialist (physiatrist) if any question arises about the appropriateness of the patient for rehabilitation. Often brain injured children appear normal, especially if the patient is in the Late Stage of recovery. Acute care staff must be aware of the subtle deficits following a brain injury, so these children are not discharged without some preparation for coping with the return to the family, school, and community. Intense rehabilitative treatment may

increase the brain injured child's ability to reach his/her optimal functioning level (McGuire and Rothenberg, 1986).

## 2. Assessment/Reassessment

Assessment of brain injured children must be ongoing since this population can change quite rapidly. However, one needs to be careful to choose appropriate assessment tools as no specific tool has been developed to assess brain injured individuals (Cohen, 1986). The tools selected must measure what the student knows and what he/she does not know to decide where teaching/treatment should begin (Cohen, 1986). If inappropriate assessment tools are used, false expectations, misunderstandings and inappropriate placements or programming may occur.

Many assessment instruments will require adaptations to obtain accurate results and clear indications of the child's abilities. Assessments should include opportunities to observe the brain injured child in different situations (e.g., formal versus informal testing situations and teaching situations). The assessment protocol must also evaluate different methods of responding and the effects of changing the presentation of the information. In each situation, the student's consistency and quality of performance should be evaluated (Cohen, 1986).

The results obtained will be useful for deciding on the best learning environment for the child. All the adaptations made in the testing protocol must be documented in reports, so the

conditions under which the patient performed are clearly described. Those who assume the standardized method was used may develop and implement inappropriate programs (Cohen, 1986).

Follow-up assessments of brain injured children are significant as these children change over time and their programs have to change with them. In addition, other difficulties may only surface later (Savage and Carter, 1988). The placements previously recommended may no longer be applicable or appropriate. Rehabilitation facilities should insure the initial recommendations were followed through and that the child is adequately coping with the school setting.

### 3. Program Development

Intervention programs specifically designed for brain injured children have not been developed. "Future research must begin to address the development of intervention programs that are specific for brain injured children" (Ewing-Cobbs et al, 1986).

Many brain injured youngsters return home and to school with minimal support services and little understanding or information about brain injury to relay to the school and community (Savage, 1987). Often these children are placed in programs designed specifically for children with different handicaps or deficits (Cohen, 1985; Cohen and Titonis, 1985; Cohen et al, 1985; Rosen and Gerring, 1986). Examples include placements with learning disabled children or mentally handicapped children.



#### 4. Community Education

One issue that raises the most concern is society's lack of awareness about brain injury. The public are generally unaware of its incidence, prevalence, effects and manifestations (Miller, 1988; Price-Spivack, 1986). Specialists trained in the field of brain injury (medical-physiatrist, nurses, rehabilitation specialists) need to educate the community. Education is necessary if appropriate programs are to be developed, if funding is to be received, and if educational facilities are to adapt their setting and provide appropriate training and education for brain injured students. "As education increases, services will improve" (Miller, 1988).

#### 5. Funding

Funding is an issue frequently raised with brain injured children and their unique needs. A lack of awareness by society about brain injury and its manifestations effects the availability of funding sources.

Funding becomes an issue when brain injured children do not meet criteria for funding purposes. The brain injured population is not viewed as a separate group in funding criteria guidelines, therefore these individuals must be adapted into another group recognized in the funding guidelines. This issue explains why the brain injured students are often placed with the learning disabled or mentally handicapped population. These two groups are

recognized separately for funding purposes. As a result funding may be provided for an inappropriate placement or the brain injured child may not receive the special education services needed to achieve success.

Organizations have been developed by professionals and individuals affected by brain injury. The purpose of these organizations is to advocate for the brain injured population. One way to advocate for this population is to educate society, especially those who can effect change in policies. The National Head Injury Foundation (NHIF) is one organization that has begun to reach government officials about educational services for brain injured students (Price-Spivack, 1986). NHIF has had a major influence on government and society regarding brain injury and the needs of this population. This must continue to insure all children who sustain a brain injury are eligible for extended rehabilitation and special education services (Price-Spivack, 1986). Funding may then be available to conduct research to ultimately improve the effectiveness of treatment and school programs for brain injured children (Bauer and Titonis, 1987).

#### 6. Hospital/School Relationship

Strong relations are needed between the staff of the discharging facility and the school as head injured children have often been lost in the transition between hospital and school (Savage and Carter, 1988). The referring facility will have

pertinent information to share with the school about the child, the brain injury and the resulting deficits. The school personnel will provide information regarding the school curriculum and changes that can be made. With professionals working together the potential for successful returns to school by brain injured students would increase (DePompei and Blosser, 1987).

#### 7. Education System Laws and Criteria

An issue with placing brain injured children in the school system is the inability of the referring center to recommend the exact placement optimal for the child. Typically, a referring center can only provide recommendations and perhaps give an example of an appropriate placement setting. The school system however ultimately decides where the child will be placed. The procedure can be very frustrating if the school administrators lack the knowledge necessary to select a suitable placement and program for the brain injured child.

Investigators have attempted to provide a procedure to ease school placement of brain injured students (DePompei and Blosser, 1987; Savage and Carter, 1984; 1988; Ylvisaker, DePompei and Blosser, 1988); however they did not address the school systems' rules and regulations and the problems that arise because of rigid systems. Often obstacle after obstacle arises in a system that fails to incorporate needed services (Bauer and Titonis, 1987).

This makes discharge planning for school very difficult and frustrating.

The levels of criteria for acceptance into specific programs are also problematic for the brain injured population. The brain injured child often exhibits variable levels of functioning and/or inconsistent performance and therefore may not meet school criteria for special services. As a result necessary services may not be provided. Again, the importance of assessment and the appropriate choice of assessment tools is illustrated. When assessing a brain injured child, care must be taken to adequately and accurately evaluate the child's skills so criteria for necessary special services will be met.

#### 8. Lack of Research

Investigators have not adequately addressed treatment efficacy for the brain injured population. Professionals need to study and evaluate treatment programs, techniques and outcomes, and document the findings so we as professionals provide the best, most effective service possible for this population.

Research is needed in all areas of pediatric brain injury, especially in terms of long-term recovery, educational implications, programming, follow-up and easing community re-entry.

## SUGGESTIONS

Professionals involved in the treatment of the pediatric brain injured population have provided suggestions to ease the brain injured student's transition to school and have provided examples of modifications the school can make to facilitate the reintegration process for brain injured students.

### 1. SUGGESTIONS FOR EASING SCHOOL TRANSITION

a) Discharge planning must begin far in advance to allow for education and preparation of the setting receiving the referral (Savage, 1987).

b) Factors such as premorbid academic capabilities, present level of functioning, the location and extent of injury, the remaining deficits, where the child lives and the available options in the child's community must be considered to determine suitable placement and programming (Cohen, 1986).

c) Visit the school chosen as a placement for the child. Evaluate the environment, the classroom and its requirements and the school personnel to determine if it is appropriate for the child (DePompei and Blosser, 1987; Savage and Carter, 1988). Consideration should be given to: the classroom situation (structure and flexibility), the amount of independent work, thinking and judgement required, the amount of time allotted to complete assignments, the teacher's ability and willingness to

adapt to the individual's needs, how information is presented (oral or written, rate), memory requirements, academic levels and materials used, the physical setting, and the support services that are available (Cohen, 1986). This allows for the target areas to be addressed prior to discharge, before difficulties arise.

d) Invite the school personnel to visit the referring facility. The visit will allow the school staff the opportunity to learn more about brain injury, the particular child's deficits, the teaching techniques used with the child, the strategies the child has learned as a means of compensating for his/her deficit areas, and the environment the child is able to perform in (Cohen, 1986).

e) Schedule a meeting with all professionals involved with the child when educational plans and programs are developed. The professionals must insure a flexible program is developed and implemented to best meet the child's changing needs (Savage and Carter, 1988).

f) Provide ongoing assessment and follow-up procedures to insure the brain injured child's placement and program are changed as he/she changes. Include descriptions of functioning in addition to the scores, so students will be placed into "more appropriate learning environments" (Cohen, 1986).

g) Consider placement of the brain injured child in a school setting within a rehabilitation setting, if available. The

child can receive intensive treatment and attend a school setting. Observation of the child in a classroom setting allows team members to determine what strategies may be most helpful for school. In addition, contact with the child while in the classroom will ease planning and placement recommendations at discharge (Szekeres, Ylvisaker and Cohen, 1987). The disadvantages of this type of school setting (discussed in Chapter V) must also be considered. Perhaps providing some opportunity for contact with the child's peer group and school could minimize the disadvantages of a school setting within a rehabilitation facility.

h) The brain injured child's placement in the classroom should occur slowly. For example, send the child to school initially two days per week then increase to three days then to full time. Initially, the child may fatigue and find a full day too difficult to cope with.

i) Provide the child with a buddy system or counsellor so the child has someone to turn to for guidance or assistance. Providing a peer for the child can also increase social interactions and help the child associate with the peer group.

j) Modify the school program according to the child's needs. The school environment provides an opportunity for the brain injured student to "develop and refine specific cognitive abilities and also to work on skill integration" (Cohen, 1986). However, the school program initially should not emphasize

academics but should rather focus on improving the student's cognitive abilities. For example, decrease the distractions in the classroom or increase the time allowed to process information (see the following section for more suggestions for modifications of the school environment and program). Once these skills (e.g., attending, processing, self-control, thought organization) improve, academic abilities typically do as well (Cohen, 1986).

k) Educate the family, school personnel, peers, and the community about brain injury, its effects, and its manifestations.

Careful planning and considerations are necessary for a smooth transition to the school, family and community. The step to school is one of the most difficult steps the brain injured child takes. It is the responsibility of those working with the brain injured child to assist him/her in making the step as successful and positive as possible.

## 2. SUGGESTIONS FOR SCHOOL MODIFICATIONS

Investigators have attempted to provide some suggestions for modifying school programs to better accommodate brain injured children (DePompei and Blosser, 1987; Light, Neuman, Lewis, Morecki-Oberg, Asarnow, and Satz, 1987; Ylvisaker, 1986; Cohen, 1986; Ewing-Cobbs et al, 1986; Rosen and Gerring, 1986). The exact modifications implemented will be dependent on the child's level of recovery and his/her deficits.



a) Environment-

The classroom environment should be modified for brain injured students. Some examples of modifications include: a highly structured setting (little free time is available), organizing the class into small groups, allowing the child to have rest times, decreasing distractions (e.g., close the door to decrease noise from the hallway), and increasing the time limits for those children who have processing difficulties (Ylvisaker, 1986; Ewing-Cobbs et al, 1986; Rosen and Gerring, 1986). Modifying the classroom environment may help the child compensate for attention/concentration deficits, distractibility, and/or decreased processing skills which are common following a brain injury.

b) Teacher-

The teacher must be prepared to modify his/her teaching strategies and expectations when a brain injured child enters the classroom. The teacher may need to do the following:

1. Provide cues to help the child understand or respond. Encourage the child to use strategies that help the child compensate for deficits (e.g., circumlocution for word retrieval difficulties) (Rosen and Gerring, 1986; Depompei and Blosser, 1987; Ylvisaker, 1986).

2. Decrease the demands made on the child. Following a brain injury, increasing the demands too quickly increases the

chance of failure and frustration. As cognitive skills improve and fatigue decreases, demands can be gradually increased (Ylvisaker, 1986).

3. Model responses to teach the child how to proceed with an assignment or to illustrate what acceptable responses require (DePompei and Blosser, 1987).

4. Provide multiple repetitions so the child has ample opportunity to process the information and respond (Ylvisaker, 1986).

5. Provide frequent feedback as brain injured students are often unable to self-monitor or determine their progress and achievements (Ylvisaker, 1986)

6. Use a multimodal approach (e.g., oral, written, gestural) so the brain injured child can utilize his/her strengths to help understand information or respond (DePompei and Blosser, 1987; Rosen and Gerring, 1986).

7. Be direct and specific when giving instructions, teaching concepts, or making requests, to assist the student's understanding and increase his/her success. Since brain injured children often have difficulty inferencing or selecting relevant information, vague comments or requests may only confuse the child (Rosen and Gerring, 1986).

8. Provide extra resources while teaching. For example, provide the student with an outline of a discussion or story, or

provide a summary of a story or a list of new vocabulary words. Extra assistance may give the child what he/she needs to cope in the classroom (Rosen and Gerring, 1986).

9. Most importantly, the teacher must modify his/her expectations and assignments to give the brain injured child the best opportunity to continue recovering without having to deal with difficulties, frustrations, and failure.

Due to the deficits that present following a brain injury (attention deficits, distractibility, word retrieval deficits, decreased integrative skills) typical educational goals may not be appropriate. The focus should be on the child's cognitive skills not on academics. Goals may include: 1) to pay attention for a specific amount of time (e.g., fifteen minutes) in a distracting situation; 2) to decrease impulsive responding and respond only when his/her name is called; 3) to maintain the topic when responding to questions.

The classroom situation is a perfect setting for the child to "develop and refine his/her cognitive abilities and to work on skill integration" (Cohen, 1986). However, care and consideration is necessary when developing educational goals. The educational plan must be suitable to the level, skills, and needs of the child.

### 3. FUTURE RESEARCH

Documentation regarding brain injured children is generally lacking. Researchers have provided information regarding causes, statistics (incidence and prevalence), and general impairment (Ewing-Cobbs et al, 1986). Few studies addressed long-term recovery in children who sustain a brain injury (Ewing-Cobbs et al, 1986). Few investigators have attempted to address the academic implications and long-term difficulties following a brain injury. Since a greater number of children are surviving from brain injury and a larger number of children are able to return to school, more effort is necessary for the schools to adequately service these children.

When brain injured children return to school and the community, few services are available (Miller, 1988; Cohen, 1986; Savage and Carter, 1988). Formal educational programs have not been developed (Cohen, 1986; Savage and Carter, 1988). To develop and implement such programs, research is necessary to evaluate effective techniques and interventions (McCabe and Green, 1986; Jaffe and Hays, 1986). Ideas for facilitating the transition of these children to school were provided, but data did not accompany these ideas to illustrate the procedures were effective. In addition, the suggestions provided were the "ideal"; the obstacles in planning school re-entry and the difficulties that arise during

the transition process were not addressed. As such, suggestions for overcoming any possible obstacles or problems are nonexistent.

Professionals who work with brain injured children must begin careful research to answer the questions underlying treatment, outcomes, school (placement, programming), future academic performance, and long-term deficits in order to help these children reach their maximum potential. Rehabilitation settings must "use systematic and scientifically sound methods of program evaluation and research so the field will advance" (Vogenthaler, 1987).

Treatment efficacy studies are lacking however, investigators have begun to document treatment studies (Light et al, 1987). Light and colleagues (1987) developed a neurocognitive education project (NEP) whose purpose was the intervention of cognitive deficits. This was one of the first attempts to develop a specific educational program for brain injured students. Small improvements were noted in cognitive functioning, however significant gains were evident in "adaptive functioning". Light et al (1987) documented the findings stating further investigation was warranted.

Investigators need to control factors such as age, severity of injury, location of damage, and the deficits that present to adequately measure treatment effectiveness and to allow for comparisons across studies (Light et al, 1987; Langfitt, 1978).

Treatment, school programs, academic performance, and outcomes of brain injured children will be enhanced as future research is conducted. So much is still relatively unknown about the pediatric brain injured population. Research is needed to obtain the answers to the many unanswered questions.

## CHAPTER VII    CONCLUDING REMARKS

The pediatric brain injured population is an interesting and challenging group of individuals for family members and professionals. Numerous changes occur following a brain injury. Communication, social and emotional behavior and physical skills are effected. These changes have a dramatic impact on the individual and the family.

The incidence of brain injury has increased and so has survival. However, society knows little about brain injury and its manifestations. This becomes a concern when children are discharged to the family, school and community. The literature indicated a lack of educational programming for these students as well as a lack of awareness by the community about brain injury and its effects, especially on school performance. As such, these children are often misunderstood by society and inadequately serviced.

Returning to school is a difficult experience for a brain injured child. He/she is "different" than before. The school and the grade level may also be different. Hospitals or rehabilitation centers need to be involved during the reintegration process to school, so returns are as positive and successful as possible. Rehabilitation personnel can aid the transition by carefully evaluating the school placement options to find the most

appropriate setting and by providing information concerning the child's functioning level, strengths, weaknesses and use of strategies to the school personnel.

Educating society, family and school personnel is most important. Many failures result because of a lack of understanding of the deficits that present following a brain injury (e.g., unrealistic expectations, misunderstanding behaviors and performance levels of the child). These misunderstandings must be eliminated as they effect the recovery process and successful returns to school.

A number of issues arose concerning the brain injured population. Specific programs for brain injured students are not available and therefore these children are often inappropriately placed or their needs are not adequately met. They may be misplaced due to assessment misinterpretations, lack of knowledge about the population, misunderstandings about the deficits and needs of the brain injured child and/or lack of information to develop appropriate programs.

Investigators have addressed brain injured children's recovery and deficits. However, few researchers have addressed returns to school, academic implications, programming, placement and follow-up. What actually has been found to be useful or helpful in transitions to school and the community have not been documented. Procedures to follow were given, but no evidence was



provided to indicate successful/unsuccessful returns occurred when these procedures were implemented.

Professionals have only recently begun to address the needs of this population and their future. Increased research and advocacy hopefully will lead to better services for brain injured children. The literature indicated increased research in areas related to school and performance was planned (Deaton, 1986; Light et al, 1987). Research will allow professionals working with brain injured children to provide better services and help these children reach their maximum potential. Educating society will allow the general public to more adequately address and demand appropriate services for brain injured children. Hopefully, brain injury will not remain a "silent epidemic" much longer.

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